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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			PEACE, RHONDA S	
			ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/814,011	Applicant(s) UCHIDA ET AL.	
	Examiner Rhonda S. Peace	Art Unit 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 37 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-13, 19-26 and 28-36 is/are rejected.
- 7) ☒ Claim(s) 14-18 and 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) The invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5-7,
Claims ~~1-3~~^{1-3, 5-7,} 9-13, 19, 21, 28, 29, 32, 35, and 36 are rejected under 35

U.S.C. 102(b) as being anticipated by Gipson et al (US 4732446).

As it pertains to claim 1, Gipson et al discloses an optoelectronic circuit board comprising the following: a board **10** with embedded optical fibers **16** where the fibers terminate in an end facet on the side wall of hole **14**, as well as an optical emitter **46** and optical detector **44** mounted on the bottom surface of the substrate and electrically connected to electrical conductor **40**, and a reflector **32** supported in hole **16** for reflecting light from the emitter **46** into the embedded fiber **16** in a radial manner (column 5 lines 39-68, Figure 1).

Addressing claims 2, 3, and 6, the emitter **46**, reflector **32**, and detector **44** are incorporated into a chip carrier **12**, that is shaped to fit in hole **16**, and positioned such that the reflector **32** is suspended from the top surface of the board **10** in order to provide optical alignment between the reflector **32** and the fiber **16** (column 6 lines 7-8 and 49-62, Figure 1).

Speaking to claim ~~4~~ **5**, the reflector **32** is configured so that it may transmit optical signals in either direction down the fiber **16**, as can be seen in the embodiment

shown in Figure 4 (column 5 lines 53-68, and column 6 lines 60-62). In addition, as shown in Figures 1 and 4, the surface of reflector **12** may be considered a surface of revolution, as it is symmetrical about a central vertical axis drawn through the chip carrier, or plug body.

Relating to claims 7 and 9, the chip carrier **12** is composed of a light transmitting material, and as the reflector **32** is located inside the chip carrier **12**, it can be considered an internally reflecting surface (column 6 lines 49-51, Figure 1). As well, and as previously mentioned, board **10** contains a plurality of fibers **16**, and reflector **32** reflects all beams corresponding to emitter **46** into the end faces of the fibers **16** (column 6 lines 14-30, Figure 2).

Pertaining to claim 10, Gipson et al discloses an optoelectronic module comprising the following: an emitter **46** and detector **44** for detecting and emitting optical signals along optical path **48**, electronic circuit **40** for receiving a signal detected by detector **44**, reflector **32** for reflecting light along optical path **48** as well as in a direction perpendicular to path **48**, where all the above mentioned components are integrated into chip carrier **12** for mounting into circuit board **10** (column 5 lines 43-68, column 6 lines 49-62, Figure 1).

In response to claim 11, optical path **48** enters hole **16** from the fiber end facet and is directed, with the use of reflector **32**, towards the detector **44**. In addition, light produced by emitter **46** travels along a second optical path, perpendicular to optical path **48**, and is directed, by reflector **32**, towards the fiber **16** end facet located on a side wall of hole **14** (column 5 lines 53-68, Figure 1).

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With regard to claims 12, 13, 19, and 21, Gipson et al discloses the use of a substrate **38** to which a plurality of emitters **46**, a plurality of detectors **44**, a plurality of electrical conductors **40**, and reflector **32** are mounted (Figure 4, column 6 lines 51-62). Also, reflector **32** is shown as a plane reflector, as can be clearly seen from Figure 1.

Addressing claims 28, 29, and 32, Gipson et al discloses the substrate **38** has a printed circuit, in the form of wire bonding, to connect electrical connector **40** with the emitter **46** and detector **44** (Figure 1, column 6 lines 1-7). In addition, Gipson et al shows optoelectronic module **12** having electrical contacts **56** to be connected to conductor tracks **52** of the main circuit board **10** (Figures 2 and 3, column 6 lines 25-30). As well, electronic connector **40** may be mounted to the top of the substrate **38** (Figure 4, column 6 lines 51-56).

Turning to claims 35 and 36, Gipson et al describes a method of forming the optoelectronic circuit board **10** where optical fibers **16** are embedded within the board **10**, and holes **14**, which extend through the board and optical fibers **16**, so that the fibers **16** are cut and each has an end facet along the side wall of a hole **14** (column 5 lines 42-47, Figure 1). Furthermore, emitters **46** and detectors **44** are mounted to the board **10**, so that their optical axis is directed into hole **14**, and a reflector **32** is suspended within hole **14** for reflecting signals emitted from emitter **46** towards the fiber **16** end facet (column 5 lines 53-68, column 6 lines 7-8, Figure 1).

Claim 34 is rejected under 35 U.S.C. 102(b) as being anticipated by Weidel (US 4966430).

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Referencing claim 34, Weidel discloses a substrate **1**, optical devices **7** and **7'** for emitting receiving a light signal along a first optical path through waveguide **5**, an electronic circuits disposed within recess **6** for supplying a drive signal for transducers **7** and **7'**, optical reflectors **8** and **8'** for reflecting the light signal along a path perpendicular to the first optical path through waveguide **5**, electrical contact through electrical conducting layer **3**, where all the above mentioned elements are mounted to a main circuit board **11** such that the first optical path through waveguide **5** is perpendicular to the main circuit board **11** when the assembly is in mounted condition (Figures 1-3, column 3 lines 13-18, 31-45, and column 4 lines 50-54).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gipson et al (US 4732446).

As to claim 20 and 22, Gipson et al discloses the device as described above, including the use of emitters 46 and detectors 44 within the chip carrier, or plug body, 12 (Figure 4). However, Gipson et al does not disclose the specific use of laser diodes as the emitters of choice, or of photodiodes as the specific detectors of choice. However, it would have been obvious to one of ordinary skill in the art to use laser diodes as light emitters and photodiodes as light detectors, as these components are well-known detectors and emitters within the art.

Claims 8, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gipson et al (US 4732446) in further view of Kropp et al (US 6457875).

Pertaining to claims 8, 23, and 24, Gipson et al discloses the device as previously described. However, Gipson et al does not disclose the use of a lens within the chip carrier **12** for the purpose of condensing light between the reflector **32** and the detector **44** or emitter **46**. Kropp et al discloses an electro-optical arrangement comprising a plug body **6** which utilizes convergent lenses **4** and **5** to condense light between reflectors **18** and **19** and a detector/emitter **1** (Figure 1 column 3 lines 49-53). It would have been obvious to one of ordinary skill in the art to combine the teachings of Kropp et al and Gipson et al, as providing a lens between the emitter (or detector) and the reflecting surface allows for the light signal to be condensed, increasing the probability of proper optical alignment between the fiber (**12** or **14** in the case of Kropp et al, **16** in the case of Gipson et al) and the emitter or detector (**1** in the case of Kropp et al, **44** or **46** in the case of Gipson et al).

Speaking to claim 25, both Gipson et al and Kropp et al disclose the device as previously described. However, neither Gipson et al nor Kropp et al disclose the use of a divergent lens within the plug body for the purpose of condensing light between the reflector and the detector (or emitter). However, it is apparent to the examiner that the shape of the lens does not show novelty, as both convergent or divergent lenses may be used. In addition, the applicant has failed to attribute any significance to the use of a divergent lens within their specification, and therefore, the particular arrangement using a divergent lens, is deemed to have been a design consideration within the skill of the art (*In re Kuhle*, 526 F.2d 553, 555, 188 USPQ 7, 9). For the reasons just discussed, it would have been obvious to one of ordinary skill in the art to incorporate a divergent

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lens, instead of a convergent lens, as both are well known in the art, and the choice is simply a matter of design preference.

Addressing claim 26, Gipson et al discloses the device as previously described. However, Gipson et al does not disclose the use of a lens within the chip carrier **12**, or that the lens and reflector are formed as different surfaces of a unitary optical element. Kropp et al shows the construction of lenses **4** and **5** and reflectors **18** and **19** as part of a unitary optical element **6** made of light transmitting material (column 3 lines 49-53, Figure 1). It would have been obvious to one of ordinary skill in the art to combine the teachings of Gipson et al and Kropp et al, as forming the lenses and reflectors as part of a unitary optical element reduces cost and simplifies the manufacturing process, as well as effectively maintains optical alignment between the emitter or detector and the optical fiber.

Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gipson et al (US 4732446) in further view of Kosemura (US 6330337).

Pertaining to claims 30-³¹~~32~~, Gipson et al discloses the device as previously described. However, Gipson et al does not disclose an arrangement such that the electrical contacts are on the underside of the substrate and are adapted for surface mounting to a main circuit board. Kosemura discloses an optical transceiver module using electrical contacts in the form of solder balls **60**, as can be seen in Figures 12B and 12C, where these solder balls **60** are configured on the bottom of substrate **10** so that the assembly may be mounted upon a main circuit board or motherboard (Figures 12B

and 12C, column 20 lines 36-41). In addition, electrical circuits may be located on the top of substrate **10** such as an LSI circuit **52** (Figure 12A-12C, column 19 lines 45-51).

Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gipson et al (US 4732446) in further view of Weidel (US 4966430).

With reference to claim 33, Gipson et al discloses the device as previously described. However, Gipson et al does not disclose an arrangement such that the first optical path is perpendicular to the circuit board. Weidel shows semiconductor circuit where the first optical path, confined within waveguide **5** as shown in Figure 2, is perpendicular to the circuit board that may be configured to the circuit, as shown in Figure 3 (Figures 2 and 3, column 3 lines 31-37, column 4 lines 44-54). It would have been obvious to one of ordinary skill in the art to combine the teachings of Weidel and Gipson et al as this allows for the device to be used in a wider range of scenarios, including those when the circuit board is in an upright position.

Allowable Subject Matter

Claim 27 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter. The most relevant prior art discussed within this Office Action does not disclose, nor does it reasonably suggest an optoelectronic module comprising a unitary optical element with a biconvex top surface and an internally reflecting bottom surface.

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As claim 27 contains this limitation not disclosed by the relevant prior art, it is the opinion of the examiner that these claims contain patentable material, and would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 14-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The most relevant prior art discussed within this Office Action does not disclose, nor does it reasonably suggest an optoelectronic circuit as has been described in the proceeding sections above and where the reflector is a concave reflector, a convex reflector, a conical reflector, a paraboloid of revolution reflector, or a pyramidal reflector. These reflector types are not known to be used in the optical circuit art, and their use therein is considered novel over the prior art.

Claim 37 is allowed.

The following is a statement of reasons for the indication of allowable subject matter: The most relevant prior art discussed within this Office Action does not disclose, nor does it reasonably suggest an optoelectronic module comprising an emitter or detector, an electronic circuit, one or more optical lenses, and a reflector, where the lenses and the reflector form a unitary optical element with a biconvex top surface and an internally reflecting bottom surface.

Response to Arguments

ADL
Applicant's arguments filed ¹²~~10~~/27/2005 have been fully considered but they are not persuasive.

Applicant has argued that Gipson et al "fails to teach a reflector positioned in the hole and configured to redirect the light signal along the optical axis substantially radially about the optical axis towards the fiber end facet as is recited in claim 1," as the light is "deflected by the beamsplitter 32 upwardly or downwardly, namely only vertically, not substantially radially, about the optical axis of the light signal." The Examiner respectfully disagrees. As is well known, light diverges upon emission from an emitter, such as the emitter 46 that has been described by Gipson et al and is shown in Figure 6 of Gipson et al. As the light diverges, it comes into contact with the reflector surface of the beamsplitter 32, so that the light beam strikes more than one location on the beamsplitter 32. This will then cause the light to be reflected, where it will continue to diverge, thereby resulting in the light "spreading out" so that it strikes the fiber end face at more than one location. Therefore, the intrinsic diverging nature of light will cause the optical signal to be reflected in a substantially radial manner about the optical axis, as is described in claim 1. As this limitation described above, which is the basis for the Applicant's arguments with respect to the rejection of all claims, can be used to describe any reflector and is not limited to phenomena seen when only three dimensional reflecting surfaces are used, it is the opinion of the Examiner that this limitation is not novel over the prior art.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tietjen (US 6912341) discloses an optical fiber link utilizing a conical reflector to transmit optical signals in a radial manner away from the reflector. ^(Fig. 25A)

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rhonda S. Peace whose telephone number is (571) 272-8580. The examiner can normally be reached on M-F (8-5).

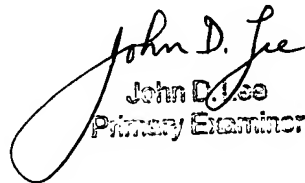
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272- 2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rhonda S. Peace
Examiner
Art Unit 2874



John D. Lee
Primary Examiner